UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,072	08/27/2001	Hong Yang	H0498/7155	3068

23628 7590 03/15/2006

WOLF GREENFIELD & SACKS, PC
FEDERAL RESERVE PLAZA
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

EXAMINER	
LOPEZ, CARLOS N	

ART UNIT	PAPER NUMBER
1731	

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/940,072	YANG ET AL.	
	Examiner	Art Unit	
	Carlos Lopez	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,7,9-38,50,52-55 and 57-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *28,29 and 58* is/are allowed.

6)☒ Claim(s) *1-4,6,7,9-27,30-38,50,52-55,57,59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/26/06 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6-7,9, 17-26, 30,37, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fain et al (US 5,340,515). Fain discloses a method of making ceramic structures using micro-molds (Abstract). The method comprises providing a mold having at least one dimension less than 100μm (See Col. 3, lines 55ff). The micro-mold is filled with a ceramic precursor such as $LiAlO_2$ as disclosed in Example 1 or $Al(NO_3)_3 \cdot 9H_2O$ as disclosed in Example 2 (See also Col. 4, lines 23ff). The micro-molds filled with the ceramic slurry are then heated in a non-oxidizing atmosphere to produce a ceramic structure (Col. 4, lines 23ff). In regards to the claimed limitation of heating in a moisture-free atmosphere, in a non-oxidizing atmosphere, oxygen element

is not present, hence water, H_2O, would also not be present in the heating atmosphere since it contains an oxygen element. Thus a non-oxidizing atmosphere reads on applicant's claimed moisture-free atmosphere. Moreover, applicant is refer to col. 4, lines 65 explicitly using an inert atmosphere, hence no water, absent any indication by Fain.

In regards to the claimed properties of the produced ceramic, it is reasoned that the claimed steps of making the ceramic are met by Fain would thus be obvious to a person of ordinary skill that the ceramic produced by Fain would have the claimed properties. The positive active steps disclosed by Fain are the same as those recited in the instant claims. Therefore, it is reasonably to conclude that the produced ceramic would have the claimed properties.

As for claim 6, the ceramic structure is $LiAlO_2$, which is a ceramic precursor.

As for claim 7, the heating step is done in an inert atmosphere, see col. 4, lines 65 or alternatively the term non-oxidizing atmosphere is used by Fain to also mean an inert atmosphere as shown in example 1.

As for claim 9 the viscosity of the ceramic slurry is sufficient to fill micro-mold tube having an inside diameter of at least 10μm.

As for claims 17-18, the mold is filled by capillary action, which would thus require the pressure of the volume of the mold being filled to have a lower pressure.

As for claim 19, 21 and 22, as noted above Fain discloses the first heating step is done in a non-oxidizing atmosphere may be initially done at a temperature of 100°C to

150°C to remove the slurry liquid (Col. 4, lines 45ff). It is this removal of the slurry liquid that is deemed as the claimed curing.

As for claims 23-24, the initially heating as noted above is done in a non-oxidizing atmosphere/inert atmosphere.

As for claim 25-26, the molded product is removed from the mold by burning off the mold (Col. 4, lines 49ff).

As for claim 30, as noted above the mold is removed by burning off the mold at a temperature of 1000°C to yield a ceramic product (See Col. 3, lines 18ff).

As for claims 37, as in Col. 3, lines 47ff, the mold is filled in an inert environment.

Claims 1-4,6-7,9, 11-22, 25-26, 30, 31, 32-38, 50, 53-55 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schueller et al (US 6,143,412). Schuller discloses fabricating of microstructures of carbon material tailored by ceramic additives (See Abstract and Col. 11, lines 45ff). The method comprises providing a micro-mold with dimensions less than 100μm (Col. 6, lines 47ff). High carbon precursors, deemed as the claimed ceramic precursors, are used to fill the micro-mold (See Col. 4, lines 60ff and Col.6, lines 57ff). As noted in Col. 13, lines 4ff, the ceramic material precursor is cured at a temperature ranging from 80°C to 150 °C, after curing the cure precursor material is removed from the mold and heated in a deoxygenated argon atmosphere to form a high carbon structure (See Col.8, lines 9ff which teaches of optionally heating the ceramic precursor in the mold). Absent any indication by Schuller, the deoxygenated argon atmosphere is deemed as the claimed moisture free atmosphere.

In regards to the claimed properties of the produced ceramic, it is reasoned that the claimed steps of making the ceramic are met by Schuller would thus be obvious to a person of ordinary skill that the ceramic produced by Schuller would have the claimed properties. The positive active steps disclosed by Schuller are the same as those recited in the instant claims. Therefore, it is reasonably to conclude that the produced ceramic would have the claimed properties.

As for claims 2-4, the ceramic precursor is furfuryl alcohol modified phenolic resin a composition that includes hydrogen, carbon, and nitrogen.

As for claim 7, argon is an inert element.

As for claims 9 and 17-18, it is inherent that ceramic precursor has sufficient viscosity in order to fill the mold via capillary as noted by Schuller in Col. 6, lines 1ff or by providing an area of low pressure when using vacuum.

As for claims 11-12 and 50, 53-55, the micromole is treated with polymethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff).

As for claims 13-14, a substrate 30 is positioned against the surface of the micromole 20 to create a cavity as shown in figure 1 for which the ceramic precursor fills.

As for claim 15, the substrate is treated with polydimethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff).

As for claim 16 and 50, 53-55, treating the micro-mold with polydimethyl siloxane is deemed as silanization. Applicant also argues that the rejection does not show that the mold has been silanized. As noted above, "the micromole is treated with polymethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff)." Treating the mold with polydimethyl siloxane by definition is silanizing the mold.

As previously noted, a polydimethyl siloxane reads on the claimed alkylating, silylating, or alkylsilylating agent. The claimed act of treating a substrate surface to render the substrate inert with respect to a reaction with a ceramic precursor is deemed by applicant to be the claimed silanizing step as noted in applicant's disclosure which would result in any subsequent products resulting from the ceramic precursor to be inert.

As for claim 19, see above.

As for claims 20-22, the precursor is both chemically cured by inducing polymerization and by thermal curing which as noted above the temperature is raised 80 °C to 150 °C.

As for claims 25-26, the mold is physically removed from the molded product (See col. 13, line 4)

As for claim 31 the product is transferred to silicon substrate to measure its resistance (Col. 13, lines 23ff).

As for claims 32-34, the precursor can be a single precursor as the noted above furfuryl alcohol modified phenolic resin or copolymers of furfuryl alcohol-phenol polymers (See Col. 8, lines 60ff).

As for claims 35-36 the mold is made of an elastomer of polymethyl siloxane (See Col. 7, lines 40ff).

As for claims 37-38, the filling of the molds can be made by applying a vacuum thus providing an inert and moisture free atmosphere while filling the molds.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schueller et al (US 6,143,412) as applied to claims 1 and 25 above and in view of Warren et al (US 4,250,127). The micro-molding process of Schueller can be used to make electron microscopy grids (see Abstract). Schueller is silent in the manner in which the mold is removed from the molded product.

Warren et al is directed to the formation of electron microscopy grids by using a micro-molding process (See Abstract). Warren teaches that removing grids formed by micro-molds by dissolving the mold with a substance that does not chemically attack the grids provides for extremely small micro-components that can be made inexpensively without damage or distortion (Col. 3, lines 23ff). As further noted by Warren in col. 4, lines 23ff, by dissolving the micro-mold, the stresses that would occur on the grids when using release agents and mechanical removal devices is eliminated.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have removed the micro-mold from the molded product of Schueller by dissolving the micro-mold as taught by Warren in order to eliminate

stresses or distortion of the molded product when removing the molded product from the mold.

Claims 10 and 52, are rejected under 35 U.S.C. 103(a) as being unpatentable over Schueller et al (US 6,143,412) as applied to claims 1 and 9 above. Schueller is silent disclosing the viscosity of the ceramic precursor. However, since the filling of the micro-molds is done by capillary action or the application of a vacuum it is reasonably to infer from the teachings of Schueller that viscosity of the ceramic precursor should be sufficiently low, at the very least less than about 500 cm^2/s, to allow for capillary filling or vacuum filling of the micro-molds. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to conduct routine experiments that would determine the viscosity of the ceramic precursor that allows for the flowing of the precursor into the micro-molds by capillary action or by the application of a vacuum.

Claims 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fain et al (US 5,340,515) as applied to claims 1 and 9. Fain is silent disclosing the viscosity of the ceramic precursor. However, since the filling of the micro-molds is done by capillary action it is reasonably to infer from the teachings of Fain that viscosity of the ceramic precursor should be sufficiently, at the very least less than about 500 cm^2/s, low to allow for capillary filling of the micro-molds. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to conduct routine experiments that would determine the viscosity of the ceramic precursor that allows for the flowing of the precursor into the micro-molds by capillary action.

Response to Arguments

Applicant's arguments filed 1/26/06 have been fully considered but they are not persuasive.

Applicant argues that a non-oxidizing atmosphere does not necessarly read on a moisture free atmosphere. As previously noted Fain discloses using a non-oxidizing atmosphere and further specifies of using an inert atmosphere, see col. 4, line 65. Hence clearly showing that there is no moisture in the atmosphere, since an inert atmosphere is considered to be an atmosphere comprised of an inert gas; Water vapor is not deemed as an inert gas. Applicant has not proven that an inert atmosphere does not contain water.

Applicant also argues that the rejection does not show that the mold has been silanized. Applicant argues that the prior art does not disclose a "silanization reaction". However, a reading of the claims only requires "silanization", which as noted below is met by Schueller, the claims do not recite a silanization reaction per se.

As noted above, "the micromole is treated with polymethyl siloxane, which is deemed as inert with respect to reaction with the ceramic precursor and subsequent products resulting from the ceramic precursor (Col. 7, lines 40ff)." Treating the mold with polydimethyl siloxane by definition is silanizing the mold. A polydimethyl siloxane reads on the claimed alkylating, silylating, or alkylsilylating agent. The claimed act of treating a substrate surface to render the substrate inert with respect to a reaction with a ceramic precursor is deemed by applicant to be the claimed silanizing step as noted in

applicant's disclosure which would result in any subsequent products resulting from the ceramic precursor to be inert.

In regards to the "evidence" submitted, the references show "silanized" as coating an object with a siloxane solution. But does not disclose a "silanization reaction." In fact the references submitted by applicant are not analogous to the claimed invention. The references are drawn to the coating of glass with a siloxane solution and not silanizing of a mold.

In regards to the arguments presented to claims 10 and 52, applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant does not rebut the prima facie case that since the filling of the micro-molds is done by capillary action it is reasonably to infer from the teachings of Fain that viscosity of the ceramic precursor should be sufficiently, at the very least less than about 500 cm^2/s, low to allow for capillary filling of the micro-molds.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Lopez whose telephone number is 571.272.1193. The examiner can normally be reached on Mon.-Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571.272.1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CL